omregion

February 23, 2011

Abstract

Calculates evselect region files for an OM source

1 Instruments/Modes

Instrument	Mode
OM	FAST

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

This task takes an OM OSW source list and a source number and produces EVSELECT region files for the source and its associated background.

The source extraction region is a circle, centred on the source position and extending out to *srcrad* (default 3) times the FWHM of the source PSF (as given in the source list). The background extraction region is normally an annulus with the inner radius of *backinner* times the source extraction radius (default 1), and the outer boundary defined by *backouter* times the source extraction radius (default 2).

If the nearest neighbour is within *srcrad* FWHM of the source extraction circle, then the source extraction circle is reduced in size until the extraction region is no longer contaminated. A warning is issued in this case.

If a source is within *srcrad* FWHM of the background extraction annulus then a circle of *srcrad* FWHM surrounding this source is excluded from the background region.

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
set	yes	string		

The input OM OSW source list

srcnumber	yes	integer		

The number of the source in the OM OSW source list

srcradius	yes	real	3	

The size of the source extraction radius: in FWHM of the source PSF, if it is positive, and in fixed pixels if it is negative

bkginner	yes	real	1	

The inner radius of the background extraction region in terms of the source region radius

bkgouter	yes	real	2	

The outer radius of the background extraction region in terms of the source region radius

nfwhm	yes	real	3	

The limiting source extent in terms of the PSF FWHM

srcfile	yes	string		

The name of the source extraction region file

bkgfile	yes	string		

The name of the background extraction region file

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS

documentation.

The source number exceeds the number of sources in the OSW *(fatal)*

6 Input Files

1. PPS product OM OSW source list (produced by OMDETECT or OMWAVELET)

7 Output Files

1. Intermediate source region file for use by EVSELECT
2. Intermediate background region file for use by EVSELECT

8 Algorithm

```
subroutine omregion

read in source list

if (srcnumber > number of sources in list) issue fatal error

locate the srcNumber'th source

x = XPOS
y = YPOS
fwhm = FHWM ! obtained from source list rather than the CAL

r1 = fwhm * srcRadius

nearest = 1.e30
loop over all sources except the selected source
   if (distance to this source < nearest) then
      nearest = distance to this source
      size = fwhm of this source
   endif
endloop


if (r1 > (nearest - nfwhm * size)) then

     r1 = nearest - nfwhm * size

     warn that the size of the extraction region is begin reduced

     if (r1 < 0) then
```

```
        warn that the source is unavoidably contaminated

        r1 = fwhm

      endif


rInner = r1 * bkgInner
rOuter = r1 * bkgOuter


ncontaminating = 0

loop over all other sources
  compute distance to source dist
  if (rInner < (dist - nfwhm * fwhm of this source) < rOuter)  then
  store contaminating source x, y, fwhm
  ncontaminating++
end loop

open source region file

write out source region file

close source region file

open background region file

write out background annulus

loop over ncontaminating sources
   write out exclusion circle for this source
end loop

close background region file

end subroutine omregion
```

9 Comments

10 Future developments

- Could use a more sophisticated method for the contamination searches, perhaps based on source flux ratios and errors
- Could have a list of source numbers as input and output a set of region files based on those sources. The output region files could be based on the input root plus the source number. The problem with this is that it would contradict the pipeline philosophy of always specifying all input and output parameters.
- omdetect and omwavelet will produce source lists with ellipsiodal shapes for objects. This task should be able to produce ellipses and elliptical annulli for the extraction regions.

References